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Echocardiographic evolution of left ventricular function in childhood leukemia survivors

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ABSTRACT

Background: Cardiac events are the most common nonmalignant cause of death in childhood cancer survivors. This population has an increased risk of morbimortality, probably secondary to the treatment side effects. The objective was to determine the prevalence and determinants of left ventricular dysfunction in a cohort of long term childhood acute leukemia survivors treated with potentially cardiotoxic therapies.

Methods: Retrospective study with at least 10 years of follow-up, diagnosed between 1999 and 2003. The reduction per-

Abbreviations: LVEF, Left ventricular ejection fraction; FS, Fractional shortening; LR, Low risk; IR, Intermediate risk; HR, High risk; ALL, Acute lymphoblastic leukemia; AML, Acute myeloblastic leukemias; LVDD, Left ventricular end-diastolic diameter; LVSD, Left ventricular telediastolic diameter; CI, Confidence interval.

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centage of the fractional shortening and ejection fraction was calculated from the diagnosis to the end of treatment and 10 years after the end of treatment. The factors associated with their decrease were analyzed.

Results: The fractional shortening and ejection fraction experienced a significant decrease 10 years after the end of treatment from 38.16 to 32 and 69.08 to 60.79, respectively. Reduction was more pronounced during the evaluation of the first year after treatment (−10.3% and −8.96%, $P < 0.05$). Associated with high tumor risk and adjuvant treatment with hematopoietic stem cell transplantation and total body radiation. No differences were found in the total anthracycline doses received. Patients with the greatest decrease had a lower age at the time of diagnosis (mean 5.7 ± 4.5 years), 62.5% (5/8) less at 5 years, and 75% received radiotherapy and hematopoietic stem cell transplantation.

Conclusion: There is already a significant decrease in the fractional shortening and ejection fraction during the first year after the end of the treatment, which is maintained 10 years after the end of treatment. Associated with high tumor risk and with total body radiation treatment and hematopoietic stem cell transplantation.

Background

Advances in the diagnosis and treatment of childhood tumours have contributed to an increase in the number of childhood cancer survivors. Currently, about 90% of patients diagnosed with acute leukaemia during childhood survive the disease.[1] Notably, this growing population remains vulnerable to a variety of long-term, therapy-related sequelae. In this sense, cardiac and cardiovascular diseases are the leading cause of nontumour-associated death in this population.[2-4] Modern therapeutic strategies include chemotherapeutic agents such as anthracyclines in their treatment protocols, which have a well-known cardiotoxicity potential. Dose-dependent relations between anthracyclines and cardiac dysfunction, as well as adjuvant strategies like radiotherapy have been extensively reviewed by previous studies.[4-6]

Myocardial damage presents mainly as dilated cardiomyopathy and is characterised by a reduction in systolic function (a decrease in left ventricular ejection fraction (LVEF) or fractional shortening (FS)). It can present during treatment, known as 'early-onset toxicity', which occurs before the first year after the end of treatment; after this time, it is named "late-onset toxicity."[4,7] Its prevalence varies widely between studies: between 1% and 57% as asymptomatic heart disease and between 0% and 16%[8,9] in studies on established cardiovascular disease.[8,10]

The aim of this study was to describe the incidence of cardiac systolic dysfunction among leukaemia childhood survivors with an extended post-treatment follow-up and to define the population at risk of developing left ventricular dysfunction and to understand the role of treatment in its development. The relevance of this paper is to understand cardiac morbidity in a growing survivor population who are particularly vulnerable to a variety of chronic health conditions and to be aware of the importance and necessity of long-term follow-up care in childhood cancer survivors.

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